

Sustainable Building Technology

INL researches standards and develops technologies for sustainable building design in support of the Department of Energy and other agencies and institutions.

Capability Portfolio

Sustainable Buildings is the industry term for “green” building design, construction, operation, and disposition. Sustainable design includes siting, water efficiency, energy, material, and indoor environment considerations. INL’s key capabilities include building energy use evaluation, research in sustainable building heating and cooling, and development of sustainable design programs.

Energy Use and Evaluation

Energy efficiency and conservation remains a cornerstone of sustainable design. Through its in-house energy management program, a staff of energy engineers have identified and enabled Lab-wide energy savings of over a million dollars per year. These engineers are also qualified in the DOE ALERT program to perform energy evaluations for federal installations such as Denali National Park and Argonne National Laboratory. INL performs computational modeling of building energy use and qualifies buildings for EPA’s Energy Star designation.

Research

Researchers are studying foundation insulation effectiveness and infiltration of interior space air under various weather conditions.



INL’s Applied Mechanics and Sustainable Design Department has created an interactive CD containing a catalog of new “green building” technologies.

Experiments are performed in actual buildings with alternate insulation schemes and instrumentation to measure heat loss. INL has developed a CO₂ tracer system to measure infiltration of fresh air through buildings, and researches use of renewable energy in different building applications. These projects involve instrumentation of a ground source heating/cooling loop in a “zero energy” home, and preheating air with transpired solar wall configurations to reduce housing utility costs.

Program Design

The U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED™) rating system for measuring how “green” a building is, has become the industry’s standard for defin-

ing sustainable design. The Federal government is using these industry standards and adopting sustainable design in federal projects. This is demonstrated by a new requirement in DOE Order 430.2 that traditional energy conservation reports on federal buildings be changed to require sustainable design reports.

INL’s two Certified Energy Managers and five LEED™ Accredited Professionals provide green building program relations for the Federal sector, and assist with developing standards and best practices for site specific applications of green design. INL also develops technical guides that describe how to apply various green processes and products.

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Test Facilities

In collaboration with the University of Wyoming and the Manufactured Housing Institute, INL opened a field test site near Laramie, Wyoming. The site is ideal for testing the structural and energy performance of buildings in response to naturally occurring winds in excess of 80 to 90 mph., and temperature extremes from +90°F to -30°F.

INL has also installed electrical power lines, phone/Internet connections, and a propane tank, a 160-channel data acquisition system, structural instrumentation, and a 10-meter weather tower to support the test facility. The meteorological tower includes wind speed and direction measurements as well as ambient temperature, pressure, solar insolation, and relative humidity.

This test home set-up near Laramie allows INL scientists and architects to evaluate the performance of building materials in adverse weather conditions.

Workers prepare for an experiment that revealed that a small solar transpired wall can provide 50°F preheat for a manufactured home (top photo); this dark wall (bottom photo) is a passive solar air preheating unit that contributes to energy- and cost-savings on an INL building.

For more information

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